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Integrated planning and management of land resources

Report of the Secretary-General

Addendum

Combating desertification and drought*

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I. Introduction

1. The present report reviews progress in the implementation of chapter 12 of Agenda 21, on combating desertification and drought, in the context of integrated land resource planning and management. It also reviews the implications of the implementation of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa for the integrated planning and management of land resources in the affected countries. It is submitted to the Commission on Sustainable Development as an addendum to the report of the Secretary-General on integrated planning and management of land resources.

2. Desertification and drought remain crucial issues for the sustainability of land use, having economic and social consequences and causing environmental degradation. The problems are worldwide, with more than 100 countries affected, but they are particularly evident in the poorest regions of the developing countries, especially in Africa.[1] At least one quarter of the total land area of the world, or 3.6 billion hectares, is affected by desertification. Recent estimates suggest that almost 1.6 billion people live in arid and semi-arid countries and that nearly half of the world's poor people live in dryland regions with fragile soils and irregular rainfall.[2]

3. The present report focuses on major trends and developments in achieving the objectives of the Convention to Combat Desertification with regard to the sustainable management of drylands. More detailed information on progress in the implementation of the Convention was reported to the Conference of the Parties at its third session (Recife, Brazil, 15-26 November 1999) and is available on the Convention web site (www.unccd.de/). The report will address the following issues in particular:

(a) Improving knowledge, understanding and assessment of land resources, present land use and land degradation;

(b) Developments and trends in integrated land resource planning and management in drylands;

(c) Emerging challenges and priorities for sustainable land resource management.

II. Improving knowledge, understanding and assessment of land resources, present land use and land degradation

4. Understanding the natural, social, cultural, economic and political features of local and national environments, particularly their dynamics and interactions, is considered as one of the basic principles of the Convention to Combat Desertification. Improvement of the knowledge base is widely considered a necessary first step for addressing the relevant problems and developing appropriate responses. Many research and data-collection activities are being implemented worldwide better to understand the state of the natural resources in dryland areas. The following examples can be mentioned:

(a) A water resources inventory and global information system (GIS) mapping for Africa is currently being carried out by FAO, using the river basin and watershed spatial units;

(b) Land resource and land degradation surveys have been carried out in sub-Saharan Africa (e.g., Burkina Faso) and Latin America (e.g., Brazil) and will provide an important basis for planning and strategies for implementing the Convention;

(c) Land cover and land-use inventories and analysis are being undertaken in several regions (e.g., global change and subsistence rangelands in southern Africa) as part of the Land-Use and Land-Cover Change (LUCC) initiative;[3]

(d) Biodiversity inventories in dryland regions are planned as a collaborative programme between the secretariats of the two Conventions on Biodiversity and the Convention to Combat Desertification.[4]

5. The knowledge base has been broadened in sectoral issues relevant to desertification and drought at national, regional and global levels. Worldwide expanding use of information technology and decision-support tools (e.g., GIS, remote-sensing and Internet) has facilitated the development of functional systems to collect, process and disseminate data on different issues. There has also been a growing effort to develop integrated information systems on desertification allowing:

(a) Data and information to be processed and analysed in a more integrated and dynamic way;

(b) Different data to be linked and compiled in a harmonized and flexible framework so as to improve dialogue across sectors (such as various national and regional networks and thematic networks on desertification, conducted, for example, by China, India, Iran (Islamic Republic of), Italy, and Latin America);

(c) Local data to be integrated into national or global information systems and networks, such as the World Overview of Conservation Approaches and Technologies (WOCAT).[5] This global database is progressively improved by a range of partners worldwide, providing data and assessments on local conservation approaches and technologies.

6. Progress has been made in better assessing the interactions between physical, ecological, social, economic and policy aspects of the desertification process. In particular, the linkages between land degradation, vegetation cover, carbon sinks, biodiversity and drought have been addressed at various levels.[6] This has provided a good basis for better synergies between the legal and policy instruments related to the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Ramsar Convention on Wetlands, and the statement of Forests Principles of Agenda 21, and for better optimizing the synergies at national and local levels.

7. The dissemination of data and information, know-how and proven technologies and experiences has been boosted by the increasing use of Internet-based networks and CD-ROMs. For example, FAO produced and distributed a CD-ROM on desertification compiling relevant bibliographic data. An increasing number of web sites and Internet databases have been developed on the subject of desertification by a large number of concerned organizations. Through links and clearing-house

mechanisms (e.g., FAO/Italy)[7] the access to this extensive information is facilitated. An inventory of drought preparedness strategies in Africa is under way with support from UNDP's office to combat desertification and drought (UNSO) and USAID. The World Agricultural Information Centre (WAICENT), developed by FAO, provides on the Internet data and statistics on agriculture and land use through a collaborative partnership with data custodian institutions in the concerned countries.

8. In response to the request of the Conference of the Parties of the Convention to Combat Desertification at its first session, a consortium of 15 agencies and organizations, both inside and outside the United Nations system, and coordinated by UNEP, developed an interactive Web-based meta-database on networks, institutions, agencies and bodies relevant to implementation of the Convention for the Committee on Science and Technology (CST) of the Convention. The database will have links to national action programmes and traditional knowledge on desertification control. The philosophy and approach to land and environmental information systems is leading towards decentralized structure and functioning, where national and international coordination units are established with the role of creating links between data custodians, harmonize and integrate data of various nature and format, and facilitate access to the information by users and decision makers.

III. Developments and trends in integrated land resource planning and management in drylands

A. Advances in addressing the socio-economic dimensions of land-use management in drylands

9. Research institutions, development organizations and non-governmental organizations have increasingly addressed traditional farming systems and socio-economic dynamics of indigenous societies as a key element of sustainability. For example, the International Centre for Agricultural Research in Dry Areas (ICARDA), a CGIAR centre located in the Syrian Arab Republic, is investigating, through case studies, the socio-economic factors that determine how resources are accessed and managed by communities of resource-users (e.g., property rights and common-property management), with particular emphasis on social, cultural and economic constraints operating beyond the farm boundaries and on estimation of economic and social costs of land degradation. Applied research has been active in identifying indicators modelling land management scenarios. The role and influence of local knowledge on land management has been particularly enhanced by the promotion of a decentralized and participatory approach, and it was reiterated as a top priority issue by the Committee on Science and Technology at the third session of the Conference of the Parties (November 1999).

10. The preparation of the national and regional action plans relating to the Convention provides an opportunity in many countries to apply the concept of the participatory approach in the early planning stages. The participatory approach integrates the technical perspectives of land users with their socio-economic concerns, such as food security, poverty alleviation, income opportunities and cultural values. In most countries the process of building a national action plan is initiated from an enlarged consultation at the national, subnational and local levels.

Stakeholder participation facilitates assessment, the identification of priorities, establishment of responsibilities and institutionalization of platforms for dialogue and negotiation. UNSO reported that in Burkina Faso, 30 provincial and 10 regional committees were set up to facilitate consultation at the local level. Civil society members, including religious leaders, were positively involved in the preparation of a national action plan in Senegal. In Cape Verde and Botswana the consultation exercise was driven by a decentralization demand by local actors and contributed to building up planning capacity at the local level. Eritrea, Kenya, Lesotho, Malawi, Sudan, Swaziland, the United Republic of Tanzania, Uganda and Zimbabwe are participating in a pilot programme to support local initiatives, aimed at promoting access to small-grant resources to address their priorities and help communities take responsibility for the programming and monitoring of resources.

11. As has been estimated, nearly half of the world's poor people live in dryland areas. But drylands may be seen as potential areas for agricultural intensification if water resources can be mobilized. The Special Programme for Food Security (SPFS), one of the FAO priority programmes since the World Food Summit in 1996, is encouraging a number of strategic activities of direct relevance to the Convention, such as water control and water-use efficiency, farming diversification and sustainable agricultural practices. To make investment in their land a viable option for farmers and other land users, supportive policies and accompanying measures are made available. These include infrastructure, post-harvest storage, processing and distribution facilities able to guarantee food production and supply as well as employment, and access to markets and income. In addition to national food self-sufficiency, regional integration and complementarity are encouraged in order to develop more effective ways to mobilize domestic resources and to attract private investments in and outside dryland areas.

12. The cultural and social links between population and landscape (spatial unit) have often been underestimated. The mobility of pastoral communities has often been seen as a major cause of degradation of marginal grazing lands, and its practice has not been promoted. It has even been banned in some regions. Seasonal movement of livestock in North Africa, central Asia and the Middle East, for example, is a traditional practice that regulates pressure on rangeland according to climatic variations and seasonal growth and allows exchanges and trade between regions with different agro-climatic conditions and favourable economic and social complementarity. The creation of resource user groups, as shown in the case study described in box 1, can increase awareness on the sustainable use of resources.

Box 1
"Social fencing" in rangeland rehabilitation in Pakistan*

Rangelands cover 93 per cent of the Balochistan province, and local communities own 90 per cent of the land. Rangeland degradation is severe, particularly in nearby villages, overgrazing being the major cause. In these arid conditions nomadic pastoralism developed over centuries.

Through a participatory rural appraisal, the villagers were made aware that the degradation problems could be overcome by restoring mixed vegetation and protecting some areas for at least three years. The establishment of village associations in the target area was instrumental for the elaboration and acceptance of "village upland use plans". The associations decided which areas to protect and which enforcement measures to be adopted, as well as the rotation schedule. An approach called "social fencing" was a key factor for ensuring respect for the agreed rules during the start-up phase. The visible effects of biomass regeneration, the planting of locally appreciated and multifunctional indigenous plant species, and the effectiveness of simple and low-cost water-harvesting techniques were all key factors.

* See FAO, "Rangeland rehabilitation in Balochistan: the experience of the Kanak Valley" (Italy, 1997).

B. Promoting sustainable land resource management techniques and practices

13. Increasing experience is gained through community-based resource management projects (*gestion des terroirs*, in French), as described in box 2. The management of common property resources, such as forests, water and grazing land, is a key issue for enhancing social cohesion and avoiding conflicts of interests. Several approaches have been used — for example, legalizing tenure and resource uses by formalizing the ownership of common property and land use rights, in accordance with the opportunities offered by the national legislation; environmental awareness; development of partnerships among communities and conservation institutions; and providing incentives for sustainable common resources management practices.

Box 2
Gestion des terroirs* in dryland Sahel: a social insight into community land use

Community-based resources management projects have been implemented in Niger, Mauritania, Mali and other West African countries by the United Nations Capital Development Fund (UNCDF) and FAO.

By mobilizing community leaders and representatives of different groups, the projects gained knowledge of the socio-spatial dimensions of the environment, creating a platform for dialogue in which the land resource uses and management mechanisms are discussed, planned and approved by the community itself. A key stage in the negotiation is the transition from a long-term sustainable strategy to the preparation of a short-term plan that addresses immediate social and economic concerns.

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* See United Nations Capital Development Fund, "Eco-development". UNCDF policy series, 1997.

14. Emphasis is being placed on traditional knowledge and good practices where these are shown to favour resource conservation and consolidate socio-economic cohesion. This principle has been the driving force behind the creation of information and decision-support systems such as WOCAT and the UNEP initiative on success stories in land degradation/desertification control. This approach is also applied in projects such as the joint UNU/UNEP/GEF programme called People, Land Management and Environmental Change (PLEC), which is carrying out joint farmer/researcher inventories and demonstrations of local management practices in critical areas from the farmer's perspective. The programme stimulates the local stakeholders to establish sound relationships with extension and research workers, policy makers and planners. There is growing awareness that traditional farming systems cannot be separated from the roles of the different groups (e.g., women, elders, religious and political leaders) in the local decision-making system. Responsibilities are linked to empowerment. Case studies have shown that working in land units that combine agro-ecological zoning (i.e., watersheds) with administrative or community boundaries facilitates the recognition or establishment of strong relationships between land resources and land uses.

15. From FAO's project experiences it appears that traditional good practices are supported when farmers have a perception of their problems.[8] Environmental awareness and management skills can be improved only if a certain level of organizational capacity is reached and if primary needs (food security, land security, income, water supply, education, communication services etc.) are first satisfied to a reasonable extent. This enabling environment is a precondition if the farmers (and for stakeholders at large) are to play an active part in the planning and decision-making process. Box 3 gives an example of institutional innovation that seems to have facilitated sustainable development processes and more efficient farming practices.

Box 3
The landcare approach

The core of the "Landcare" model which was developed in Australia is effective local community groups in partnership with local government. Essential elements of the approach are:

(a) A flexible set of proven technologies for small-holder agro-forestry and conservation farming;

(b) Farmer exposure to these technologies through on-farm observation and trial;

(c) Development of a farmers' organization to diffuse widely successful knowledge about the technologies within the municipality;

(d) Financial support from local government (municipal and village) to enhance the sustainability of the movement.

The International Centre for Research in Agroforestry (ICRAF), a CGIAR centre based in Nairobi, is testing the Landcare experience in Indonesia, the Philippines and Thailand, by developing a knowledge base for action at the field, community, and watershed levels, using practical conservation farming and agro-forestry practices (focusing on technical innovations that promise more sustainable upland agricultural systems on the farm); experiences of farmer-led organizations for solving sustainable agriculture and natural resource management problems; and processes of natural resource management devolution from the national to the local government level, all based on field research in key watersheds.

Experiences from its wide adoption in Australia (where it now consists of some 4,600 grass-roots community groups and the supporting institutional apparatus) and in other countries suggests that the Landcare approach, as an institutional innovation for conservation farming in the tropics, may provide a way to share technical information much more efficiently, spread the adoption of new practices, enhance research and foster farm and watershed planning processes. Conservation farming provides a sound basis on which farmers can organize their own associations to seek practical ways of overcoming their problems. The diffusion of such technologies has been greatly enhanced by the evolution of local Landcare groups.

16. The replacement of damaging practices with innovative solutions that can cope with local social and ecological peculiarities and are simple to adopt and self-sustainable is behind the development and promotion of land management techniques encompassed in the concept of conservation agriculture. The objective of conservation agriculture is to promote production systems able to satisfy stable production, economic viability and effective conservation and optimum use of water, soil and agro-biodiversity components. It is based on the adoption of sustainable land-use practices by farmers and rural communities and their capacity to mitigate the land degradation factors. Conservation agriculture involves very

diverse site-specific applications and therefore cannot be a standardized technology package. It is a methodological approach aimed at developing farmer-driven solutions for specific problems, enhancing the resilience of farming systems and optimizing the natural interactions and synergies of land resources, such as soil, micro-organisms, water, agro-biodiversity and crop rotations.

17. The ouputs and the lessons learned from the application of conservation agriculture are potentially very useful, influencing policy-making and emphasizing the goal of sustainable agriculture. Although examples of successful conservation agriculture in intensive and mechanized farming are well recorded in some countries, such as Brazil and Australia, applications in lower-input systems in dryland conditions are still limited in many countries. However, traditional practices and the preliminary results of conservation agriculture have been assessed and promoted by programmes such as WOCAT. That initiative, launched in 1992 by a consortium of international institutions, has been further developed with additional successful case studies and is now available on CD-ROM and soon on the Internet.

18. The support of private sector technology and services, the establishment of a policy enabling environment and the visibility of social and economic benefits for farmers are important for the dissemination of sustainable practices. More recently, conservation agriculture opportunities have been developed and tested in small-holder conditions using the community or the watershed as the referential units. Sustained support to field activities, dissemination of the results and integration of the approach in training and extension messages should be at the top of the agenda. In addition, the driving forces behind the development of conservation agriculture must be duly considered; they include economic policies (subsidies and incentives, input supply and prices), training and extension services, and land tenure regimes.

19. National and local capacity-building is widely considered to be an essential condition for promoting an integrated approach to land planning and management. To translate the participatory approach into effective empowerment and self-reliance of local actors, particular emphasis has been given in the training of administrators, practitioners and local partners to planning and managing programmes such as national action plans and drought preparedness. The objectives are to decentralize skills, increase awareness, harmonize national and local strategies and match planned activities with local conditions. On the other hand, the promotion of good practices and innovative solutions and their adoption in the field need the full involvement of farmers and practitioners as well as of the people involved in research and extension. Several training approaches have been developed and applied at various levels. "Farmers field schools" (e.g., in Cuba) are promoting improved collaboration between farmers and researchers and, through that synergy, developing viable *in situ* demonstrations. "Farmer-to-farmer" programmes promote the role of farmers as extensionists building on successful farmer-driven practices. The "farmer innovators" approach stresses the capacity of farmers to adapt their farming systems to innovative techniques and to the changing requirements and the role of farmer as catalysts in the transfer of appropriate technology. These methodologies differ in name rather than in approach. They all show positive results in terms of:

(a) Integrating local knowledge and innovative technology;

(b) Adoption or improvement of sustainable land use practices by farmers;

(c) Improved relations and collaboration between research, land users and extension services;

(d) Cost-effectiveness and reduced dependence on external know-how and inputs.

20. Water resource limitation, both in quantity and quality, is intrinsically related to drylands. Most dryland societies are strongly dependent on agriculture, despite the risks involved. Drought mitigation and prevention strategies aim at helping people "learning to live with drought".[9] The launching of decentralized drought preparedness and mitigation programmes contributes to the capacity of local communities to plan, develop and manage their own desertification and drought responses and strengthens their responsibility for the management of their land and water resources. This requires programmes tailored to local agro-climatic conditions and to the local social and economic factors, since they determine the type of agricultural development that is most relevant. A watershed and catchment approach is progressively adopted. The water-use strategies and technologies differ according to the prevailing local skills and socio-economic conditions and to the required investments. In Israel, for example, efficient water distribution methods make it possible to irrigate arid soils.

21. The use of drip irrigation has been shown to minimize losses and lower the salinity in the root zone. Brackish water can be used for salt-tolerant species, and organic material from urban and agricultural waste is also used as compost to rehabilitate saline soils. It is clear that these practices are heavily dependent on research and investments and may not all be applicable in poor dryland countries. However, there are basic concepts of land and water management that may well serve for site-specific (but transferable) solutions. The following can be mentioned:

(a) Optimization of available water by improving distribution and minimizing losses by, for example, increased water harvesting and storage, piped supply and localized irrigation;

(b) Recycling waste water from urban and livestock farming sources, after ensuring that its quality is suitable for crops and human health;

(c) Increasing the water retention capacity of the soil by applying, for example, mulching, soil cover and shading;

(d) Selecting and developing drought- and salt-tolerant crops, a practice that is linked to biotechnology, promotion of indigenous species and agro-biodiversity.

C. Comprehensive and integrated policies and planning processes

22. The ratification of the Convention to Combat Desertification by 159 countries is a binding commitment to combat desertification and related degradation problems and to integrate its initiatives into broader development policies and mechanisms. International agencies, including the International Fund for Agricultural Development (IFAD), UNSO, UNEP, FAO, the World Bank, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Meteorological Organization (WMO), play a key role in assisting countries to prepare their national action plans and to implement Conference-related activities. In most signatory countries, the process of elaborating national, regional and/or

subregional action plans is under way with variable results and progress. In Burkina Faso, Mali, Senegal, Togo and Uganda the national action plan has been completed and placed under the coordination of a national environmental action plan secretariat. The action plan itself constitutes the umbrella strategy for other specific land-related plans and programmes, such as the Soil Fertility Initiative. In Zimbabwe the district environmental action plans provide the framework into which the national action plan has been integrated. In Botswana and Ethiopia, national conservation strategies provide the framework for the national action plan. Due to the early stage of the national action plan building process, it is difficult to assess the short-term benefits realized at the regional, national, subnational levels and their concordance with longer term environmental and socio-economic objectives. Results to date are more visible in the advancement of the plan processes than in actual control of desertification. In resolution 54/223 the General Assembly invited affected developing countries that had not yet adopted their national action programmes or, where appropriate, regional or subregional action programmes, to try to finalize them no later than the end of 2000.

23. On a global scale, there is growing recognition of synergies. The secretariat of the Conference to Combat Desertification has signed memoranda of understanding with the secretariats of the Convention on Biological Diversity and of the Ramsar Convention on Wetlands. Consultations are also under way with the Framework Convention on Climate Change. The secretariat of the Conference to Combat Desertification has also developed or is in the process of developing memoranda of understanding with other institutional partners, such as FAO, UNESCO, the United Nations Development Programme (UNDP), UNEP, IFAD and GEF.

24. There is growing diversification as regards the establishment of financing mechanisms to fund plans and initiatives related to the Convention to Combat Desertification. For example, the use of debt-for-environment swaps for national desertification funds is being considered by several countries and by bilateral and multilateral donors. However, the problems of access to financial resources still remains a major constraint for rural dwellers. According to FAO sources, national desertification funds are being designed or established in 22 countries as small grants and loans schemes accessible to communities, non-governmental organizations and local actors. These instruments can provide a major boost to the adoption of the participatory approach and can empower local communities to advance their own initiatives without waiting for governmental or donor budget approval. Financing opportunities for small-scale entrepreneurs are being considered by several funding and development agencies, such as UNDP and the African Development Bank. Since 1998, GEF support to land degradation and desertification activities has grown as the linkages between land degradation, deforestation and the GEF focal areas[10] have been better defined and analysed. Also, the nature and functions of the Convention's global mechanism as a broker for projects at the small-holder level are being developed.

25. The Convention principle of developing partnerships and cooperation on land resource management, in order to optimize the human resources available and minimize the risk of conflicts over land-use options, has been a driving force at various levels in the process of building national action plans and in the implementation of Convention-related activities. At the policy level, the dialogue between international agencies and financing institutions has been enhanced by developing agreed or complementary strategies, identifying common priorities (i.e.,

inclusion of land degradation issues in GEF focal areas), harmonizing financing procedures and establishing consultative mechanisms and networks for exchange and dissemination. At the research level, an increasing number of partnerships have been established between international research organizations and research and development institutions in the Convention countries, such as the national agriculture research systems. However, human resources and technical and financial means are often a limiting factor in these efforts. The participatory approach applied to the management of common property resources provides a comprehensive ground for partnership-building at the community level. The crucial involvement of civil society in the preparation of national action plans has raised the need for mutual support at the national and international levels, leading to the creation of a global non-governmental organization network, Réseau international des ONG sur la désertification (RIOD).

IV. Challenges and priorities for comprehensive and sustainable land resource management

A. Developing a comprehensive framework

26. One of the main challenges of sustainable land management in drylands is to identify reliable indicators on desertification status and trends in order to assess the extent of the problem, forecast the evolution and monitor the impact of the various responses. Within the physical parameters, soil and terrain degradation or loss is the most reliable and measurable criterion of desertification. Vegetation coverage, density of species, soil fertility, erosion and salinization are among the most commonly used parameters, but their change may be also due to climatic cycles. The focus is currently more directly on socio-economic issues. Although socio-economic indicators, such as migration, income levels and conflict, may not be uniquely related to desertification, they may serve as early warning signals that desertification processes are beginning and may provide a useful monitoring framework for assessing the impact of related actions.

27. There have been growing demands from Convention signatory countries for standardized and reliable assessment methodologies and tools to be used in the national/regional action plan implementation process and to serve as reference systems for planning, managing and monitoring Convention-related activities. Although there is general agreement on the use of methods such as remote-sensing, soil maps and surveys, climatic data, socio-economic statistics, GIS and ground-checking, the parties have not reached a consensus so far on global methodology, scale or a common set of integrated indicators. During the third session of the Conference of the Parties, there was a general call for integrating energy, water management and forestry-related issues into a comprehensive assessment framework on land degradation. Special priority was given to the development of early warning systems and to an enhanced role for traditional knowledge and indigenous people in the decision-making process.

B. Focusing on "hot spots" of land degradation and critical interfaces among land uses

28. Drylands are, by definition, critical land systems. The effects of desertification and drought are even more acute as pressures on land resources increase. The pressures can become manifest in various ways and eventually turn into conflicts of interest between different users. Examples of critical land systems particularly relevant in dryland areas are described below.

1. Desert margins

29. Initiatives for controlling sand encroachment and desert expansion have been carried out in many drylands in the African Sahel by promoting agro-forestry, managing grazing land and mobility of herds, increasing water-storage capacity and maintaining the economic and social functions of oasis ecosystems. More emphasis is currently placed on improving traditional land management systems that are based on the capacity of local agro-biodiversity to respond and adapt to these extreme conditions.

2. Mountain environments

30. In drylands, mountains are often the main source of water for downstream areas. Any land-use changes in the headwaters of rivers is of paramount importance for lowland irrigation and other water uses. The conservation of land and water resources in mountain areas is being carried out in several regions (e.g., the Guinea highlands at the sources of the Niger River, the Himalayas at the sources of the Indus and Ganges rivers) by improving farming systems and reducing the rate of deforestation. More information on this topic can be found in the report of the Secretary-General on sustainable mountain development (E/CN.17/2000/6/Add.3).

3. Inland waters, groundwater reserves and wetlands

31. Lakes and groundwater reserves are a strategic source of water and development opportunities. Inland wetlands constitute an important land and water interface capable of mitigating the effects of hydro-climatic variations. However, fragile wetlands have been reclaimed for agriculture or urban development in several countries, and water resources have been overexploited for irrigation purposes. The Aral Sea in central Asia, which has been reduced to one fifth of its previous volume, is one of the worst environmental disasters in recent years and has become of global concern because of the resulting human health hazards and destruction of nature.

4. River basins and watersheds

32. It is widely held that integrated approaches to macro- and micro-ecosystems facilitate an equitable sharing of water resources. This is particularly relevant for international water basins. An integrated approach also favours the monitoring and control of upstream/downstream interactions and the development of land-use options that combine resource conservation and increasing productivity.

5. Coastal areas

33. The pressures of population growth and rural migration on land and water resources are particularly acute in coastal areas. Natural ecosystems — for example, wetlands, estuaries and deltas, mangroves and dunes — face competition from multiple land and water uses, such as urban and industrial development, farming, aquaculture and tourism. This land/sea interface has been addressed in many regions, including drylands. Integrated Coastal Area/Zone Management (ICAM or ICZM) approaches have been applied at various scales and can respond to different development objectives while taking into consideration the other issues at stake. The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), which was adopted in 1995, has as its main objectives identification of the various land-based sources of pollution (including nutrients and sediments) and prevention of the degradation of the marine environment. A clearing-house mechanism is being developed by the UNEP/GPA secretariat.

6. Forests

34. Tree resources are usually scarce in drylands, and they are threatened by demands for timber products, fuelwood for households, shelter and food for animals and agro-forestry. To reduce the pressure on forests and tree resources, alternatives to unsustainable practices must be developed (e.g., non-wood energy sources, improved stoves in households). The multiple functions of forest resources must also be promoted and supported through resource conservation for the benefits they offer to farming as well as to other social and economic interests in local communities and the concerned countries. (See E/CN.17/2000/6/Add.1, on combating deforestation). The special needs and requirements of developing countries with low forest cover and unique types of forest are receiving more emphasis, especially by the Intergovernmental Forum on Forests (IFF) of the Commission.

C. Meeting the challenges of increasing pressures and competing demands on land resources

35. The major challenge in addressing critical land systems is to create an integrated framework of technical, social, economic and policy mechanisms that enable the decision makers and the stakeholders to anticipate and respond to the increasing pressure. This enabling environment should take into particular consideration the following factors:

(a) Land tenure and land security: stabilizing land ownership and use rights (including common resources) is a precondition for promoting among farmers and rural communities the concept of land as a renewable and dynamic resource;

(b) Economic long-term viability must be guaranteed for land users. Supportive trade, financial and fiscal policies must accompany the promotion of good practices. Farmers will not envisage investment in better land husbandry unless the resulting benefits will be fully appreciated and internalized;

(c) Visibility of benefits must be emphasized in the promotion of good practices. This includes socio-economic benefits, such as increased incomes,

equitable sharing, improved livelihood and community and family cohesion, as well as environmental benefits;

(d) Empowerment and participation of stakeholders, whose roles and responsibilities must be clearly defined, in particular for common resource management and wherever interactions with other land users and actors are instrumental for the sustainability of the whole land system — for example, upstream/downstream relationships and production and marketing agreements;

(e) Complementarity between national policies and local initiatives (subsidiarity): creating platforms for dialogue and decentralized consultation mechanisms would facilitate the harmonization and integration between national strategies and action plans and local responses. Policies as well as legislation should enhance complementarity in the decision-making process and in the establishment of sound responsibilities and roles.

Notes

[1] The global nature of the problem is evidenced by the fact that an additional regional implementation annex to the Convention for the countries of Eastern and Central Europe is currently being drafted.

[2] Mahendra Shah and Maurice Strong, *Food in the 21st Century: From Science to Sustainable Agriculture* (Consultative Group on International Agricultural Research, 1999), pp. 63-64.

[3] LUCC is a joint initiative of the International Geosphere-Biosphere Programme (IGBP) and the International Human Dimensions Programme on Global Environmental Change (IHDP). This multidisciplinary initiative has three main focal areas: land-use dynamics, land-cover changes and regional and global models.

[4] See, for example, United Nations Environment Programme, *Biological Diversity of Dryland, Mediterranean, Arid, Semi-Arid, Grassland and Savannah Ecosystems: Options for the Development of a Programme of Work* (Nairobi, 1999).

[5] WOCAT, a part of FAO's Land and Water Digital Media Series, is implemented by a pool of international and national research and development agencies.

[6] See, for example, the report of the third Conference of the Parties (ICCD/COP(3)/20 and Add.1).

[7] FAO and Italy have jointly developed an Internet-based access to information and data relevant to desertification. See *www.fao.org/desertification*.

[8] For example, Indigenous Soil and Water Conservation in Africa, a FAO project currently implemented in Burkina Faso, Cameroon, Ethiopia, Tanzania, Tunisia, Uganda and Zimbabwe and funded by the Government of the Netherlands.

[9] FAO, Sub-Regional Office for Southern and Eastern Africa, *Drought Impact Mitigation and Prevention — A Long Term Perspective* (Rome, 1999).

[10] GEF focal areas are climate change, biodiversity, ozone protection, and international waters.